

**IN THE CLAIMS**

Please amend the claims as follows:

1. (currently amended) A time-domain communication system for use in an ultrasonic imaging system ~~100~~, the time-domain communication system comprising:

an ultrasonic array ~~112~~ having a plurality of ultrasonic array outputs ~~210~~;

a time-domain multiplexer ~~114~~ having an input connected to each of the plurality of ultrasonic array outputs ~~210~~ and having a multiplexer output ~~230~~, the time-domain multiplexer ~~114~~ continually cycles through each of the plurality of ultrasonic array outputs ~~210~~ at a predetermined frequency connecting each of the plurality of ultrasonic array outputs ~~210~~ to the multiplexer output ~~230~~ for a predetermined amount of time, wherein the plurality of ultrasonic array outputs ~~210~~ comprises a first number of outputs and the multiplexer output ~~230~~ comprises a second number of outputs, the first number of outputs being greater than the second number of outputs;

a de-multiplexer ~~140~~ having an input connected to the multiplexer output ~~230~~, the de-multiplexer having a plurality of de-multiplexer outputs ~~330~~, the de-multiplexer ~~140~~ continually cycles through each of the plurality of de-multiplexer outputs ~~330~~ at the predetermined frequency connecting each of the plurality of de-multiplexer outputs ~~330~~ to the multiplexer output ~~230~~ for the predetermined amount of time, wherein the plurality of de-multiplexer outputs ~~330~~ comprises a third number of outputs, the third number of outputs being greater than the second number of outputs;

a time gain control amplifier ~~150~~ connected to each of the plurality of de-multiplexer outputs ~~330~~ and amplifying each respective signal in each of the plurality of de-multiplexer outputs ~~330~~;

an analog to digital converter ~~160~~ connected to the time gain control amplifier, ~~150~~ wherein each respective signal in each of the plurality of de-multiplexer outputs ~~330~~ is converted to a digital signal at a sample frequency rate; and

a timing reference 180-connected to the time-domain multiplexer 114, the demultiplexer 140 and the analog to digital converter 160 for providing a single timing reference to determine at least the predetermined frequency and the sample frequency rate.

2. (currently amended) The system of ~~Claim 1~~ claim 1, wherein the analog to digital converter 160 is connected to image processing electronics for generating an ultrasonic image.

3. (currently amended) The system of ~~Claim 1~~ claim 1, wherein the ultrasonic array 112 comprises a plurality of cables bundles wherein each of the plurality of cable bundles includes at least one ultrasonic array output of the plurality of ultrasonic array outputs 210.

4. (currently amended) The system of ~~Claim 3~~ claim 3, wherein the time-domain multiplexer 114 comprises a plurality of time-domain multiplexers and the demultiplexer 140 comprising a plurality of de-multiplexers 340, each of the plurality of time-domain multiplexers 114 having a multiplexer output, 230, 340 wherein each of the plurality of time domain multiplexers 114 are connected to a respective one of the plurality of cable bundles and the multiplexer output 230, 340 of each of the plurality of time-domain multiplexer 114 being connected to a respective one of the plurality of de-multiplexers 140, 320.

5. (currently amended) The system of ~~Claim 1~~ claim 1, wherein the predetermined frequency comprises the sample frequency rate times the first number of outputs.

6. (currently amended) A time-domain communication system for use in an ultrasonic imaging system ~~100~~, the communications system comprising:

an ultrasonic probe, ~~110~~ comprising:

an ultrasonic array ~~112~~ having a plurality of ultrasonic array outputs ~~210~~;

and

a time-domain multiplexer ~~114~~ having an input connected to each of the plurality of ultrasonic array outputs ~~210~~ and having a multiplexer output ~~230~~ wherein the time-domain multiplexer ~~114~~ continually cycles through each of the plurality of ultrasonic array outputs ~~210~~ at a predetermined frequency connecting each of the plurality of ultrasonic array outputs ~~210~~ to the multiplexer output ~~230~~ for a predetermined amount of time;

an ultrasonic data processing unit, ~~130~~ comprising:

a de-multiplexer ~~140~~ connected to the multiplexer output ~~230~~, the de-multiplexer ~~140~~ having a plurality of de-multiplexer outputs ~~330~~ wherein the de-multiplexer ~~140~~ continually cycles through each of the plurality of de-multiplexer outputs ~~330~~ at the predetermined frequency connecting each of the plurality of de-multiplexer outputs ~~330~~ to the multiplexer output ~~230~~ for the predetermined amount of time;

a timing reference ~~180~~ connected to the time-domain multiplexer ~~114~~ and the de-multiplexer ~~140~~ for providing a single timing reference to determine at least the predetermined frequency.

7. (currently amended) The system of ~~Claim 6~~ claim 6, wherein the plurality of ultrasonic array outputs ~~210~~ comprises a first number of outputs and the multiplexer output ~~230~~ comprises a second number of outputs, the first number of outputs being greater than the second number of outputs.

8. (currently amended) The system of ~~Claim 7~~ claim 7, wherein the plurality of de-multiplexer outputs ~~330~~ comprises a third number of outputs, the third number of outputs being greater than the second number of outputs.

9. (currently amended) The system of ~~Claim 6~~ claim 6, further comprising a time gain control amplifier ~~150~~ connected to each of the plurality of de-multiplexer outputs ~~330~~ and amplifying each respective signal in each of the plurality of de-multiplexer outputs ~~330~~.

10. (currently amended) The system of ~~Claim 9~~ claim 9, further comprising an analog to digital converter ~~160~~ connected to the time gain control amplifier ~~160~~ and the timing reference, ~~180~~ wherein each respective signal in each of the plurality of de-multiplexer outputs ~~330~~ is converted to a digital signal at a sample frequency rate.

11. (currently amended) The system of ~~Claim 10~~ claim 10, wherein the analog to digital converter ~~160~~ is connected to image processing electronics ~~170~~ for generating an ultrasonic image.

12. (currently amended) The system of ~~Claim 6~~ claim 6, wherein the ultrasonic array ~~112~~ comprises a plurality of cables bundles, wherein each of the plurality of cable bundles includes at least one of the plurality of ultrasonic array outputs.

13. (currently amended) The system of ~~Claim 12~~ claim 12, wherein the time-domain multiplexer ~~114~~ comprises a plurality of time-domain multiplexers ~~114~~ and the de-multiplexer ~~140~~ comprising a plurality of de-multiplexers ~~320~~, each of the plurality of time-domain multiplexers ~~114~~ having a multiplexer output, ~~230, 340~~ wherein each of the plurality of time domain multiplexers ~~114~~ ~~are~~ is connected to a respective one of the plurality of cable bundles and the multiplexer output ~~230, 340~~ of each of the plurality of time-domain multiplexer ~~114~~ being connected to a respective one of the plurality of de-multiplexers ~~140, 320~~.

14. (currently amended) A method for time-domain communication in an ultrasonic imaging system, the method comprising the steps of:

acquiring ultrasonic data from an ultrasonic array;

transmitting the ultrasonic data via a plurality ultrasonic array outputs to a time-domain multiplexer having an input connected to each of the plurality of ultrasonic array outputs, the plurality of ultrasonic array outputs comprising a first number of outputs;

continually cycling through each of the plurality of ultrasonic array outputs at a predetermined frequency to connect and transmit the ultrasonic data from the plurality of ultrasonic array outputs to at least one multiplexer output for a predetermined amount of time, the at least one multiplexer output having a second number of outputs, wherein the first number of outputs is greater a second number of outputs;

connecting the at least one multiplexer output to a de-multiplexer having a plurality of de-multiplexer outputs, the plurality of de-multiplexer outputs comprising a third number of outputs, wherein the third number of outputs is greater than the second number of outputs;

continually cycling through the plurality of de-multiplexer outputs at the predetermined frequency to connect each of the plurality of de-multiplexer outputs to the at least one multiplexer output and to transmit the ultrasonic data from the multiplexer output to the plurality of de-multiplexer outputs;

amplifying the ultrasonic data in the plurality of de-multiplexer outputs;

converting the amplified ultrasonic data to digital ultrasonic data at a sampling frequency rate; and

creating an ultrasonic image from the digital ultrasonic signal.

15. (currently amended) The method of ~~Claim 14~~ claim 14, wherein the predetermined frequency comprises the sample frequency rate multiplied by the first number of outputs.

16. (currently amended) The method of ~~Claim 14~~claim 14, wherein the predetermined frequency and the sample frequency rate are provided by a timing reference.

17. (currently amended) A method for time-domain communication in an ultrasonic imaging system, the method comprising the steps of:

acquiring ultrasonic data from an ultrasonic array;  
transmitting the ultrasonic data via a plurality ultrasonic array outputs to a time-domain multiplexer having an input connected to each of the plurality of ultrasonic array outputs, wherein the plurality of ultrasonic array outputs comprising a first number of outputs;

continually cycling through each of the plurality of ultrasonic array outputs at a predetermined frequency to connect and transmit the ultrasonic data from each of the plurality of ultrasonic array outputs to at least one multiplexer output for a predetermined amount of time;

connecting the at least one multiplexer output to a de-multiplexer having a plurality of de-multiplexer outputs; and

continually cycling through the plurality of de-multiplexer outputs at the predetermined frequency to connect each of the plurality of de-multiplexer outputs to the at least one multiplexer output and to transmit the ultrasonic data from the multiplexer output to the plurality of de-multiplexer outputs.

18. (currently amended) The method of ~~Claim 17~~claim 17, wherein the at least one multiplexer output has a second number of outputs and the first number of outputs being greater a second number of outputs.

19. (currently amended) The method of ~~Claim 18~~claim 18, wherein the plurality of de-multiplexer outputs comprises a third number of outputs and the third number of outputs is greater than the second number of outputs.

20. (currently amended) The method of ~~Claim 17~~claim 17, further comprising the step of amplifying the ultrasonic data output from the plurality of demultiplexer outputs.

21. (currently amended) The method of ~~Claim 17~~claim 17, further comprising the step of converting the ultrasonic data to digital ultrasonic data at a sampling frequency rate.

22. (currently amended) The method of ~~Claim 18~~claim 18, further comprising the step of creating an ultrasonic image from the digital ultrasonic signal.

23. (currently amended) The method of ~~Claim 18~~claim 18, wherein the predetermined frequency comprises the sampling frequency rate multiplied by the first number of outputs.

24. (currently amended) The method of ~~Claim 18~~claim 18, wherein the predetermined frequency and the sampling frequency rate are provided by a timing reference.